REMARKS/ARGUMENTS

In response to the Office Action mailed April 25, 2005, Applicants amend their application and request reconsideration. No claims are added or cancelled so that claims 1-19 remain pending.

In this Amendment, claim 1, the sole examined independent claim, is amended consistent with the disclosure of the patent application. Claims 3 and 11 are amended in view of the amendment of claim 1 and are likewise consistent with the original disclosure.

The invention concerns a method of making a semiconductor device, particularly one that includes a low dielectric constant insulating layer. As explained in the patent application, these low dielectric materials are particularly important in manufacturing semiconductor devices operating at high speeds.

The invention is particularly directed to a method in which a number of films, a stopper film, an interlayer insulating film, i.e., the low dielectric constant material, and a capping film are sequentially deposited on a semiconductor substrate. Then, a resist film is formed on the capping film and patterned. Thereafter, the capping film is etched, where exposed, and etching continues to remove part of the interlayer insulating film so that the stopper film is ultimately exposed. Without removing the resist film, the stopper film is removed by etching to provide access to a conductive layer that is in the semiconductor substrate. Thereafter, the resist film is removed by ashing.

Claim 1 has been amended to specify that the ashing is carried out in a gas mixture consisting of hydrogen and an inert gas that does not react with hydrogen. This description is supported by the patent application at page 8, lines 21-29. Attention is particularly directed to the sentence beginning in line 26 pointing out that nitrogen, which might be considered an inert gas in some circumstances, is not an inert in this instance because nitrogen can react with hydrogen and adversely affect the low dielectric constant material in the ashing process. In view of the amendment of claim 1, claims 3 and 11 are amended and describe argon and helium as candidate inert gases, consistent with the description in the cited paragraph at page 8 of the patent application.

Claims 1, 2, 10, 15, and 19 were rejected as anticipated by Chooi et al. (U.S. Patent 6,372,636, hereinafter Chooi). This rejection is respectfully traversed with regard to the

claims now pending. Further, it is assumed that the Examiner intended to reject, as anticipated by Chooi, claims 7 and 16, claims not mentioned in the Office Action.

In order to anticipate claim 1, Chooi must disclose every element of the claimed invention. Chooi fails to meet that stringent requirement, at least with respect to the ashing step at the end of claim. The pertinent description in Chooi appears in column 8 in the paragraph beginning in line 5. As described there, the photoresist layer of Chooi is removed, "preferably by oxygen plasma etching." Claim 1 makes clear that the ashing process used in removing the resist film according to the invention is not ashing in an oxygen plasma but rather ashing in a plasma formed in a gas mixture consisting of hydrogen and a gas that does not react with hydrogen. Therefore, the rejection for anticipation based upon Chooi must be withdrawn.

Claims 3, 4, 11, and 12 were rejected as obvious over Chooi in view of Chien et al. (U.S. Patent 6,426,304, hereinafter Chien). This rejection is respectfully traversed with regard to all claims now pending.

Claims 3 and 11, as examined, included limitations now part of claim 1, namely specifying the use of a mixture consisting of hydrogen and an inert gas in the ashing process. Further, amended claim 1 qualifies the inert gas of former claims 3 and 11 as a gas that does not react with hydrogen.

Chien was relied upon with regard to a passage in column 6 describing removing of resist in an ashing process in which a mixture of hydrogen and nitrogen are supplied to a reaction chamber. Clearly, this disclosure is outside the scope of any pending claim since nitrogen, an element that can react with hydrogen, is excluded from the claimed process. In fact, since Chien did not recognize the potentially adverse consequences of stripping photoresist from a low dielectric constant material in a plasma including nitrogen, Chien actually teaches against the invention as defined by the amended claims. Therefore, no pending claim can be obvious in view of any potential modification of Chooi with Chien.

Claims 5, 6, 13, and 14 were further rejected over Chooi in view of Chien and further in view of Ranft et al. (U.S. Patent 6,536,449, hereinafter Ranft).

The rejected claims further describe using hydrogen in combination with either of argon or helium in the ashing process for removing the resist film. Attention was directed to column 3 of Ranft which describes residue removal prior to photoresist removal. Thus, Ranft, at least as to this portion, is of questionable relevance to the claimed invention since

the mixtures of gases mentioned in Ranft do not relate to ashing but relate to a residue removal step in advance of ashing. In any event, according to Ranft, in the residue removal process the appropriate gases are hydrocarbons, ammonia, water vapor, or alcohols or "mixtures of hydrogen and inert gases such as noble gases or nitrogen, partially fluorinated hydrocarbons, difluoromethane (CH_2F_2), other fluorocarbons...or mixtures of other halogenated gases such as Freon gases. Very small amounts of oxygen may also be used,...".

Clearly, there is no suggestion in Ranft, in the cited portion, that relates to photoresist stripping and there is no description that any mixture of gases used in the residue removal process described should exclude gases that react with hydrogen. Of particular importance is the statement in Ranft that nitrogen is equally useful as a diluent with noble gases, quite contrary to the findings of the present inventors and their invention as reported in the present patent application and as defined by the claims now pending. Accordingly, no claim now pending can be obvious in view of any combination of Chooi, Chien, and Ranft.

Claims 8 and 17 were rejected as unpatentable over Chooi in view of Chang et al. (U.S. Patent 6,319,850, hereinafter Chang). This rejection is respectfully traversed.

Chang was cited merely as showing certain low dielectric constant films having particular compositions and being porous. While the rejection may have been pertinent to the claims presented for examination, the rejection has no pertinence to the claims now pending. Therefore, it is sufficient to state that the rejection cannot properly be maintained.

Since the claims now presented clearly distinguish from the prior art, upon reconsideration, all of claims 1-19 should be allowed.

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